ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING
REGULATIONS – 2015
CHOICE BASED CREDIT SYSTEM

PROGRAMME EDUCATIONAL OBJECTIVES:

I. Equip the students with sufficient theoretical, analytical and initiative skills in Basic Sciences and Engineering necessary, to assimilate, analyze, synthesis and innovate solutions to meet societal needs.
II. To provide adequate research ambience enabling the students to inculcate thirst for life long learning and sustained research interest.
III. To instill and practice values, leadership qualities and team spirit to promote entrepreneurship and indigenization.

PROGRAMME OUTCOMES:

(a) Ability to apply technical knowledge in mathematics, Science and Engineering leading to the realization and evaluation of complex systems, through research problems in the context of evolving societal needs.
(b) Imaginative critical thinker with an ability to think critically, analyze and solve engineering problems.
(c) Ability to design a system, component, or process to meet desired needs within realistic constraints.
(d) Demonstrate the ability to, gather user needs and requirements, design, develop, integrate, and test complex systems by employing systems engineering thinking and processes, within required operational and acquisition system environments.
(e) Personal and intellectual autonomy to independently and with an openness to reflect upon and use modern engineering tools necessary to engineering practices.
(f) Educational practices necessary to understand the impact of engineering solutions in a global, economical, environmental and societal context.
(g) An active and committed global citizen with an awareness of contemporary issues and their impact on economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
(h) An understanding of professional, ethical, legal issues and responsibilities.
(i) A creative, enterprising team player and engaged participative leader able to effect change.
(j) A confident, resilient and adaptable individual with good communication skills.
(k) Actively explores new ideas through life long learning.
(l) Exercise their responsibilities in the management of cost-effective systems product development by leading and participating in interdisciplinary teams.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES:

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	a	b	c	d	e	f	g	h	i	j	k	l
i	√	√	√	√	√	√	√	√		√	√	√
ii	√	√	√	√	√	√	√			√	√	√
iii					√	√	√	√	√	√	√	√

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

A broad relation between the Course Outcomes and Programme Outcomes is given in the following table

COURSE OUTCOMES		PROGRAMME OUTCOMES											
Sem	**Course Name**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
I	Foundational English	√			√	√		√	√	√	√	√	
	Mathematics - I	√	√	√	√							√	√
	Engineering Physics	√	√	√	√							√	√
	Engineering Chemistry	√	√	√	√							√	√
	Computing Techniques	√	√	√	√	√						√	√
	Basic Sciences Laboratory	√	√	√	√	√						√	√
	Computer Practices Laboratory	√	√	√	√	√						√	√
II	Technical English	√			√	√		√	√	√	√	√	√
	Mathematics - II	√	√	√	√							√	√
	Physics for Electronics and Information Science	√	√	√	√							√	√
	Circuit Theory	√	√	√	√		√					√	√
	Electronic Devices	√	√	√	√		√					√	√
	Engineering Graphics												
	Electron Devices and Circuits Laboratory	√	√	√	√	√						√	√
	Engineering Practices Laboratory	√	√	√	√	√						√	√
III	Transform Techniques and Partial Differential Equations	√	√	√	√							√	√
	Signals and Systems	√	√	√	√		√					√	√
	Data Structures and Object Oriented Programming In C++	√	√	√	√	√	√					√	√
	Electronic Circuits – I	√	√	√	√		√					√	√
	Digital Electronics and System Design	√	√	√	√		√					√	√
	Basics of Electrical Engineering	√	√	√	√		√					√	√
	Digital and Electronic Circuits Laboratory.	√	√	√	√	√	√					√	√
	Electrical Engineering Laboratory	√	√	√	√	√						√	√
IV	Linear Algebra and Numerical Methods	√	√	√	√							√	√
	Communication Theory	√	√	√	√		√					√	√
	Electromagnetic Fields and Waves	√	√	√	√		√					√	√
	Electronic Circuits-II	√	√	√	√		√					√	√
	Operational Amplifiers and Analog Integrated Circuits	√	√	√	√		√					√	√
	Microprocessor and Microcontrollers	√	√	√	√		√					√	√
	Electronic Circuits II Laboratory	√	√	√	√	√						√	√
	Microcontroller and Interfacing Laboratory	√	√	√	√	√						√	√
V	Digital Communication Techniques	√	√	√	√		√					√	√
	Control systems Engineering	√	√	√	√		√					√	√
	Transmission Lines and Wave Guides	√	√	√	√		√					√	√
	Discrete Time Signal Processing	√	√	√	√		√					√	√
	Computer Architecture and Organization	√	√	√	√		√					√	√
	Professional Elective - I												
	Communication Systems Laboratory	√	√	√	√	√						√	√
	Discrete Time Signal Processing Laboratory	√	√	√	√	√						√	√
	Seminar	√	√	√	√	√	√					√	√

VI	Principles of Management		√	√	√			√	√	√	√	√	√
	Antennas and Wave Propagation	√	√	√	√		√					√	√
	Communication Networks	√	√	√	√		√					√	√
	VLSI Design	√	√	√	√		√					√	√
	RF and Microwave Communication	√	√	√	√		√					√	√
	Open Elective - I*												
	VLSI Laboratory	√	√	√	√	√						√	√
	RF and Microwave Laboratory	√	√	√	√	√						√	√
	Comprehension	√	√	√	√							√	√
VII	Wireless Communication	√	√	√	√		√					√	√
	Optical Communication	√	√	√	√		√					√	√
	Environmental Science and Engineering	√	√	√	√		√					√	√
	Principles of Digital Image Processing	√	√	√	√		√					√	√
	Professional Elective - II												
	Open Elective - II *****												
	Optical Communication Laboratory	√	√	√	√	√						√	√
	Wireless Communication and Networking Laboratory	√	√	√	√	√						√	√
	Mini Project / Industrial Training (6 weeks)	√	√	√	√	√				√	√	√	√
VIII	Professional Elective - III												
	Professional Elective - IV												
	Professional Elective - V												
	Project Work	√	√	√	√	√				√	√	√	√

ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING
REGULATIONS – 2015
CHOICE BASED CREDIT SYSTEM
CURRICULA I - VIII SEMESTERS
AND
SYLLABI I - III SEMESTERS

SEMESTER I

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS7151	Foundational English	HS	4	4	0	0	4
2.	MA7151	Mathematics - I	BS	4	4	0	0	4
3.	PH7151	Engineering Physics	BS	3	3	0	0	3
4.	CY7151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE7151	Computing Techniques	ES	3	3	0	0	3
PRACTICALS								
6.	BS7161	Basic Sciences Laboratory	BS	4	0	0	4	2
7.	GE7161	Computer Practices Laboratory	ES	4	0	0	4	2
			TOTAL	**25**	**17**	**0**	**8**	**21**

SEMESTER II

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS7251	Technical English	HS	4	4	0	0	4
2.	MA7251	Mathematics - II	BS	4	4	0	0	4
3.	PH7255	Physics for Electronics and Information Science	BS	3	3	0	0	3
4.	EC7251	Circuit Theory	ES	4	2	2	0	3
5.	EC7201	Electronic Devices	ES	3	3	0	0	3
6.	GE7152	Engineering Graphics	ES	5	3	2	0	4
PRACTICALS								
7.	EC7211	Electron Devices and Circuits Laboratory	ES	4	0	0	4	2
8.	GE7162	Engineering Practices Laboratory	ES	4	0	0	4	2
			TOTAL	**31**	**19**	**4**	**8**	**25**

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EC7301	Electronic Circuits – I	PC	4	2	2	0	3
2.	EC7352	Data Structures and Object Oriented Programming In C++	EEC	5	3	2	0	4
3.	EC7353	Digital Electronics and System Design	PC	3	3	0	0	3
4.	EC7355	Signals and Systems	ES	4	2	2	0	3
5.	EE7252	Basics of Electrical Engineering	ES	3	3	0	0	3
6.	MA7358	Transform Techniques and Partial Differential Equations	BS	4	4	0	0	4
PRACTICALS								
7.	EC7311	Digital and Electronic Circuit Laboratory.	PC	4	0	0	4	2
8.	EE7361	Electrical Engineering Laboratory	ES	4	0	0	4	2
			TOTAL	**31**	**17**	**6**	**8**	**24**

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Communication Theory	PC	3	3	0	0	3
2.		Electromagnetic Fields and Waves	ES	3	3	0	0	3
3.		Electronic Circuits-II	PC	4	2	2	0	3
4.		Microprocessors and Microcontrollers	PC	3	3	0	0	3
5.		Operational Amplifiers and Analog Integrated Circuits	PC	3	3	0	0	3
6.		Linear Algebra and Numerical Methods	BS	4	4	0	0	4
PRACTICALS								
7.		Electronic Circuits II Laboratory	PC	4	0	0	4	2
8.		Microcontroller and Interfacing Laboratory	PC	4	0	0	4	2
			TOTAL	**28**	**18**	**2**	**8**	**23**

SEMESTER V

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Control Systems Engineering	ES	3	3	0	0	3
2.		Digital Communication Techniques	PC	3	3	0	0	3
3.		Transmission lines and Wave Guides	PC	3	3	0	0	3
4.		Computer Architecture and Organization	PC	3	3	0	0	3
5.		Discrete Time Signal Processing	PC	3	3	0	0	3
6.		Professional Elective - I	PE	3	3	0	0	3
PRACTICALS								
7.		Communication Systems Laboratory	PC	4	0	0	4	2
8.		Seminar [#]	EEC	2	0	0	2	1
9.		Discrete Time Signal Processing Laboratory	PC	4	0	0	4	2
			TOTAL	**28**	**18**	**0**	**10**	**23**

SEMESTER VI

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Antennas and Wave Propagation	PC	3	3	0	0	3
2.		Communication Networks	PC	3	3	0	0	3
3.		RF and Microwave Communication	PC	3	3	0	0	3
4.		VLSI Design	PC	3	3	0	0	3
5.		Principles of Management	HS	3	3	0	0	3
6.		Open Elective - I*	OE	3	3	0	0	3
PRACTICALS								
8.		RF and Microwave Laboratory	PC	4	0	0	4	2
7.		VLSI Laboratory	PC	4	0	0	4	2
9.		Comprehension [#]	EEC	2	0	0	2	1
				28	**18**	**0**	**10**	**23**

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Optical Communication	PC	3	3	0	0	3
2.		Wireless Communication	PC	3	3	0	0	3
3.		Principles of Digital Image Processing	PC	3	3	0	0	3
4.		Environmental Science and Engineering	HS	3	3	0	0	3
5.		Professional Elective - II	PE	3	3	0	0	3
6.		Open Elective - II *****	OE	3	3	0	0	3
PRACTICALS								
7.		Optical Communication Laboratory	PC	4	0	0	4	2
8.		Wireless Communication and Networking Laboratory	PC	4	0	0	4	2
9.		Mini Project / Industrial Training (6 weeks) #	EEC	4	0	0	4	2
			TOTAL	**30**	**18**	**0**	**12**	**24**

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Professional Elective - III	PE	3	3	0	0	3
2.		Professional Elective - IV	PE	3	3	0	0	3
3.		Professional Elective - V	PE	3	3	0	0	3
PRACTICALS								
4.		Project Work	EEC	20	0	0	20	10
			TOTAL	**29**	**9**	**0**	**20**	**19**

TOTAL NO. OF CREDITS:182

*** Course from the curriculum of other UG programmes**
 # The Contact periods will not appear in the slot time table

HUMANITIES AND SOCIAL SCIENCES (HS)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Foundational English	HS	4	4	0	0	4
2.		Technical English	HS	4	4	0	0	4
3.		Principles of Management	HS	3	3	0	0	3
4.		Environmental Science and Engineering	HS	3	3	0	0	3

BASIC SCIENCES (BS)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Mathematics I	BS	4	4	0	0	4
2.		Engineering Physics	BS	3	3	0	0	3
3.		Engineering Chemistry	BS	3	3	0	0	3
4.		Basic Science Lab	BS	4	0	0	4	2
5.		Mathematics - II	BS	4	4	0	0	4
6.		Physics for Electronics Engineering and information Science	BS	3	3	0	0	3
7.		Transform Techniques and Partial Differential Equations	BS	4	4	0	0	4
8.		Linear Algebra and Numerical Methods	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Computing Techniques	ES	3	3	0	0	3
2.		Computer Practice Laboratory	ES	4	0	0	4	2
3.		Circuit Theory	ES	4	2	2	0	3
4.		Electronic Devices	ES	3	3	0	0	3
5.		Engineering Graphics	ES	5	3	2	0	4
6.		Electron Devices and Circuits Laboratory	ES	4	0	0	4	2
7.		Engineering Practices Laboratory	ES	4	0	0	4	2
8.		Electromagnetic Fields and Waves	ES	3	3	0	0	3
9.		Basics of Electrical Engineering	ES	3	3	0	0	3
10.		Electrical Engineering Laboratory	ES	3	3	0	0	3

11.		Control Systems Engineering	ES	3	3	0	0	3
12.		Signals and Systems	ES	4	2	2	0	3
13.		Electromagnetic Fields and Waves	ES	3	3	0	0	3

PROFESSIONAL CORE (PC)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Electronic Circuits – I	PC	4	2	2	0	3
2.		Communication Theory	PC	3	3	0	0	3
3.		Digital and Electronics Circuit Lab	PC	4	0	0	4	2
4.		Digital Electronics and System Design	PC	3	3	0	0	3
5.		Electronic Circuits-II	PC	4	2	2	0	3
6.		Computer Architecture and Organisation	PC	3	3	0	0	3
7.		Operational Amplifiers and Analog Integrated Circuits	PC	3	3	0	0	3
8.		Electronic Circuits II Laboratory	PC	4	0	0	4	2
9.		Digital Communication Techniques	PC	3	3	0	0	3
10.		Micro processor and Microcontrollers	PC	3	3	0	0	3
11.		Transmission lines and wave Guides	PC	3	3	0	0	3
12.		Discrete Time Signal Processing	PC	3	3	0	0	3
13.		Microcontroller and Interfacing Laboratory	PC	4	0	0	4	2
14.		Communication Systems Laboratory	PC	4	0	0	4	2
15.		Wireless Communication	PC	3	3	0	0	3
16.		Antennas and Wave Propagation	PC	3	3	0	0	3
17.		Communication Networks	PC	3	3	0	0	3
18.		VLSI Design	PC	3	3	0	0	3
19.		RF and Microwave Communication	PC	3	3	0	0	3
20.		Wireless Communication and Networks Laboratory	PC	4	0	0	4	2

21.		Discrete Time Signal Processing Laboratory	PC	4	0	0	4	2
22.		Optical Communication	PC	3	3	0	0	3
23.		Principles of Digital Image Processing	PC	3	3	0	0	3
24.		RF and Microwave Laboratory	PC	4	0	0	4	2
25.		Optical Communication Laboratory	PC	4	0	0	4	2
26.		VLSI Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Operating Systems	PE	3	3	0	0	3
2.		Adhoc and Wireless Sensor Networks	PE	3	3	0	0	3
3.		Advanced Digital Signal Processing	PE	3	3	0	0	3
4.		Advanced Wireless Communication	PE	3	3	0	0	3
5.		CAD for VLSI	PE	3	3	0	0	3
6.		CMOS Analog IC Design	PE	3	3	0	0	3
7.		Cognitive Radio Communication	PE	3	3	0	0	3
8.		Digital Control Engineering	PE	3	3	0	0	3
9.		Digital Switching and Transmission	PE	3	3	0	0	3
10.		Information Theory	PE	3	3	0	0	3
11.		Introduction to Embedded Controllers	PE	3	3	0	0	3
12.		Introduction to Web Technology	PE	3	3	0	0	3
13.		Measurements and Instrumentation	PE	3	3	0	0	3
14.		Medical Electronics	PE	3	3	0	0	3
15.		MEMS and Microsystems	PE	3	3	0	0	3
16.		Mixed Signal IC Design	PE	3	3	0	0	3
17.		Optical Networks	PE	3	3	0	0	3

18.		Parallel and Distributed Processing	PE	3	3	0	0	3
19.		RF Microelectronics	PE	3	3	0	0	3
20.		Satellite Communication	PE	3	3	0	0	3
21.		VLSI Signal Processing	PE	3	3	0	0	3
22.		Wireless Communication Networks	PE	3	3	0	0	3
23.		Advanced Microcontrollers	PE	3	3	0	0	3
24.		Cryptography and Network Security	PE	3	3	0	0	3
25.		Electro Magnetic Interference and Compatibility	PE	3	3	0	0	3
26.		Foundations for Nano Electronics	PE	3	3	0	0	3
27.		Multimedia Compression and Networks	PE	3	3	0	0	3
28.		Real Time and Embedded systems	PE	3	3	0	0	3
29.		Robotics	PE	3	3	0	0	3
30.		Soft Computing and Applications	PE	3	3	0	0	3
31.		Speech Processing	PE	3	3	0	0	3
32.		Disaster Management	PE	3	3	0	0	3
33.		Foundation Skills In Integrated Product Development	PE	3	3	0	0	3
34.		Human Rights	PE	3	3	0	0	3
35.		Engineering Ethics and Human Values	PE	3	3	0	0	3
36.		Total Quality Management	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Data Structures and Object Oriented Programming in C++	EEC	5	3	2	0	4
2.		Seminar	EEC	2	0	0	2	1
3.		Comprehension	EEC	2	0	0	2	1
4.		Mini Project / Industrial Training (6 weeks)	EEC	4	0	0	4	2
5.		Project Work	EEC	20	0	0	20	10

SUMMARY

SL. NO.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL
		I	II	III	IV	V	VI	VII	VIII	
1.	HS	4	4				3	3		14
2.	BS	12	7	4	4					27
3.	ES	5	14	8	3	3				33
4.	PC			8	16	16	16	13		69
5.	PE					3		3	9	15
6.	OE						3	3		6
7.	EEC			4		1	1	2	10	18
	Total	21	25	24	23	23	23	24	19	182
8.	Non Credit / Mandatory									

HS7151 **FOUNDATIONAL ENGLISH** **L T P C**
4 0 0 4

COURSE DESCRIPTION:
This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:
- To develop the four language skills – Listening, Speaking, Reading and Writing.
- To improve the students' communicative competence in English.
- To teach students the various aspects of English language usage.

CONTENTS

UNIT I GREETING AND INTRODUCING ONESELF 12

Listening- Types of listening – Listening to short talks, conversations; **Speaking** – Speaking about one's place, important festivals etc. – Introducing oneself, one's family/ friend; **Reading** – Skimming a passage– Scanning for specific information;**Writing**- Guided writing - Free writing on any given topic (My favourite place/ Hobbies/ School life, writing about one's leisure time activities, hometown, etc.); **Grammar** – Tenses (present and present continuous) -Question types - Regular and irregular verbs; **Vocabulary** – Synonyms and Antonyms.

UNIT II GIVING INSTRUCTIONS AND DIRECTIONS 12

Listening – Listening and responding to instructions; **Speaking** – Telephone etiquette - Giving oral instructions/ Describing a process – Asking and answering questions; **Reading** – Reading and finding key information in a given text - Critical reading - **Writing –**Process description(non-technical)- **Grammar** – Tense (simple past& past continuous) - Use of imperatives – Subject – verb agreement – Active and passive voice; - **Vocabulary** – Compound words – Word formation – Word expansion (root words).

UNIT III READING AND UNDERSTANDING VISUAL MATERIAL 12

Listening- Listening to lectures/ talks and completing a task; **Speaking** –Role play/ Simulation – Group interaction; **Reading** – Reading and interpreting visual material; **Writing**- Jumbled sentences – Discourse markers and Cohesive devices – Essay writing (cause & effect/ narrative);**Grammar** – Tenses (perfect), Conditional clauses –Modal verbs; **Vocabulary** –Cause and effect words; Phrasal verbs in context.

UNIT IV CRITICAL READING AND WRITING 12

Listening- Watching videos/ documentaries and responding to questions based on them; **Speaking** Informal and formal conversation; **Reading** –Critical reading (prediction & inference);**Writing**–Essay writing (compare & contrast/ analytical) – Interpretation of visual materials; **Grammar** – Tenses (future time reference);**Vocabulary** – One word substitutes (with meanings) – Use of abbreviations & acronyms – Idioms in sentences.

UNIT V LETTER WRITING AND SENDING E-MAILS 12

Listening- Listening to programmes/broadcast/ telecast/ podcast;**Speaking** – Giving impromptu talks, Making presentations on given topics- Discussion on the presentation;**Reading** –Extensive reading;**Writing**- Poster making – Letter writing (Formal and E-mail) ;**Grammar** – Direct and Indirect speech – Combining sentences using connectives;**Vocabulary** –Collocation;

TEACHING METHODS:
Interactive sessions for the speaking module.
Use of audio – visual aids for the various listening activities.
Contextual Grammar Tea21ching.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL: 60 PERIODS

LEARNING OUTCOMES:

- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication

TEXTBOOK:

1. Richards, Jack.C with Jonathan Hull and Susan Proctor **New Interchange: English for International Communication. (level 2, Student's Book)** Cambridge University Press, New Delhi: 2010.

REFERENCES:

1. Bailey, Stephen. **Academic Writing: A practical guide for students**. New York: Rutledge, 2011.
2. Morgan, David and Nicholas Regan. **Take-Off: Technical English for Engineering**. London: Garnet Publishing Limited, 2008.
3. Redston, Chris & Gillies Cunningham **Face2Face** (Pre-intermediate Student's Book & Workbook) Cambridge University Press, New Delhi: 2005.
4. Comfort, Jeremy, et al. **Speaking Effectively: Developing Speaking Skills for Business English.** Cambridge University Press, Cambridge: Reprint 2011.

MA7151	MATHEMATICS – I (Common to all branches of B.E. / B.Tech. Programmes in I Semester)	L	T	P	C
		4	0	0	4

OBJECTIVES:

- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I DIFFERENTIAL CALCULUS 12

Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Errors and approximations – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES:

- Understanding of the ideas of limits and continuity and an ability to calculate with them and apply them.
- Improved facility in algebraic manipulation.
- Fluency in differentiation.
- Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
- Understanding the ideas of differential equations and facility in solving simple standard examples.

TEXT BOOKS:

1. James Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, New Delhi, 2008.
2. Narayanan S. and Manicavachagom Pillai T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2014.
4. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

REFERENCES:

1. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
4. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2nd Edition, 5th Reprint, 2009.
5. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.

PH7151 **ENGINEERING PHYSICS** **L T P C**

(Common to all branches of B.E / B.Tech programmes) **3 0 0 3**

OBJECTIVE:

- To introduce the basic physics concepts relevant to different branches of Engineering and Technology.

UNIT I PROPERTIES OF MATTER 9

Elasticity – Poisson's ratio and relationship between moduli (qualitative) - stress-strain diagram for ductile and brittle materials, uses - factors affecting elastic modulus and tensile strength - bending of beams - cantilever - bending moment - Young's modulus determination - theory and experiment - uniform and non-uniform bending - I shaped girders - twisting couple - hollow cylinder - shaft - torsion pendulum - determination of rigidity modulus- moment of inertia of a body (regular and irregular).

UNIT II ACOUSTICS AND ULTRASONICS 9

Classification of sound - loudness and intensity - Weber-Fechner Law - standard intensity and intensity level - decibel - reverberation - reverberation time - calculation of reverberation time for different types of buildings – sound absorbing materials - factors affecting acoustics of buildings : focussing, interference, echo, echelon effect, resonance - noise and their remedies. Ultrasonics: production - magnetostriction and piezoelectric methods - detection of ultrasound - acoustic grating – ultrasonic interferometer - industrial applications – Non-destructive testing - ultrasonic method: scan modes and practice.

UNIT III THERMAL AND MODERN PHYSICS 9

Thermal expansion - thermal stress - expansion joints - bimetallic strips - thermal conductivity-heat conductions in solids – flow of heat through compound media - Forbe's and Lee's disc method: theory and experiment- Black body radiation – Planck's theory (derivation) – Compton effect – wave model of radiation and matter – Schrödinger's wave equation – time dependent and independent equations – Physical significance of wave function – particle in a one dimensional box.

UNIT IV APPLIED OPTICS 9

Interference - Michelson interferometer: construction, working, determination of wave length and thickness - anti-reflection coating - air wedge and its applications - Lasers – principle and applications – Einstein's coefficients – CO_2 and Nd:YAG laser - semiconductor lasers: homo junction and hetro junction - construction and working – applications. Optical fibres - classification (index & mode based) - principle and propagation of light in optical fibres - acceptance angle and numerical aperture - fibre optic communication system - active and passive sensors.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – Single crystals: unit cell, crystal systems, Bravais lattices, ditections and planes in a crystal, Miller indices - interplanar distance for a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - structure and significance of NaCl, CsCl, ZnS and graphite - crystal imperfections: point defects, line defects – Burger vectors, dislocations and stacking faults – Growth of single crystals: Bridgman and Czochralski methods.

TOTAL: 45 PERIODS

OUTCOME:

- The students will acquire knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXT BOOKS:

1. Gaur R.K. and Gupta S.L., "Engineering Physics", Dhanpat Rai Publications 2013.
2. Palanisamy P.K., "Engineering Physics", Scitech Publications (P) Ltd. 2006.
3. Arumugam M., "Engineering Physics", Anuradha Publications 2000.

REFERENCES:

1. Serway R.A. and Jewett, J.W. “Physics for Scientists and Engineers with Modern Physics”. Brooks/cole Publishing Co. 2010.
2. Tipler P.A. and Mosca, G.P., “Physics for Scientists and Engineers with Modern Physics”. W.H.Freeman, 2007.
3. Markert J.T.,Ohanian, H. and Ohanian, M. “Physics for Engineers and Scientists”. W.W.Norton & Co. 2007.

CY7151	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To develop an understanding about fundamentals of polymer chemistry.
- Brief elucidation on surface chemistry and catalysis.
- To develop sound knowledge photochemistry and spectroscopy.
- To impart basic knowledge on chemical thermodynamics.
- To understand the basic concepts of nano chemistry.

UNIT I POLYMER CHEMISTRY 9

Introduction: Functionality-degree of polymerization. Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.

UNIT II SURFACE CHEMISTRYAND CATALYSIS 9

Adsorption-Types of adsorption-adsorption of gases on solids- adsorption from solutions- Types of isotherms – Frendlich adsorption isotherm, Langmuir adsorption isotherm. Industrial applications of adsorption. Catalysis: Characteristics and types of catalysts-homogeneous and heterogeneous, auto catalysis. Enzyme catalysis -factors affecting enzyme catalysis, Michaelis - Menton equation. Industrial applications of catalysts.

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of photochemistry-Grotthuss - Draper law, Stark-Einstein law and Lambert-Beer Law. Photo processes-internal conversion, inter-system crossing, fluorescence, phosphorescence, chemiluminescence and photo-sensitization. Spectroscopy: Electromagnetic spectrum-absorption of radiation-electronic, vibrational and rotational transitions. Width and intensities of spectral lines. Spectrophotometric estimation of iron. UV-Vis and IR spectroscopy-principles, instrumentation (Block diagram) and applications.

UNIT IV CHEMICAL THERMODYNAMICS 9

Second law: Entropy-entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtzand Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations-Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation- variation of chemical potential with temperature and pressure.

UNIT V NANOCHEMISTRY 9

Basics-distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Preparation of nanoparticles – sol-gel and solvothermal.Preparation of carbon nanotube by chemical vapour deposition and laser ablation.Preparation of nanowires by VLS growth, electrochemical deposition and electro spinning. Properties and uses of nanoparticles, nanoclusters, nanorods, nanotubes and nanowires.

TOTAL: 45 PERIODS

OUTCOMES:

- Will be familiar with polymer chemistry, surface chemistry and catalysis.
- Will know the photochemistry, spectroscopy and chemical thermodynamics.
- Will know the fundamentals of nano chemistry.

TEXT BOOKS:

1. Jain P. C. & Monica Jain., "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2014.
2. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2014

REFERENCES:

1. Pahari A., Chauhan B., "Engineering Chemistry", Firewall Media, New Delhi, 2012.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.
3. Ashima Srivastava. Janhavi N N, Concepts of Engineering Chemistry", ACME Learning Private Limited., New Delhi., 2010.
4. Vairam S., Kalyani P., Suba Ramesh., "Engineering Chemistry", Wiley India Pvt Ltd., New Delhi., 2011.

GE7151	COMPUTING TECHNIQUES	L	T	P	C
	(Common to all branches of Engineering and Technology)	**3**	**0**	**0**	**3**

OBJECTIVES:

- To learn programming using a structured programming language.
- To provide C programming exposure.
- To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

UNIT I INTRODUCTION 9

Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.

UNIT II C PROGRAMMING BASICS 9

Introduction to C programming – Fundamentals – Structure of a C program – Compilation and linking processes - Constants, Variables – Data Types – Expressions - Operators –Decision Making and Branching – Looping statements – Solving Simple Scientific and Statistical Problems.

UNIT III ARRAYS AND STRINGS 9

Arrays – Initialization – Declaration – One dimensional and two dimensional arrays - Strings- String operations – String Arrays - simple programs- sorting- searching – matrix operations.

UNIT IV POINTERS 9

Macros - Storage classes –Basic concepts of Pointers– Pointer arithmetic - Example Problems - Basic file operations

UNIT V FUNCTIONS AND USER DEFINED DATA TYPES 9

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion –Enumerators – Structures - Unions

TOTAL :45 PERIODS

OUTCOMES

At the end of the course, the student should be able to:

- Write C program for simple applications
- Formulate algorithm for simple problems
- Analyze different data types and arrays
- Perform simple search and sort**.**
- Use programming language to solve problems.

TEXT BOOKS:

1. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013
2. Ashok N. Kamthane, "Computer programming", Pearson Education, 2007.
3. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

REFERENCES:

1**.** Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006

2**.** Byron S Gottfried, "Programming with C", Schaums Outlines, Second Edition, Tata Mc Graw-Hill, 2006.

3**.** R.G. Dromey, "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.

BS7161	BASIC SCIENCES LABORATORY	L	T	P	C
	(Common to all branches of B.E. / B.Tech Programmes)	0	0	4	2

OBJECTIVE:

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

PHYSICS LABORATORY: (Any Seven Experiments)

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of young's modulus
3. Uniform bending – Determination of young's modulus
4. Lee's disc Determination of thermal conductivity of a bad conductor
5. Potentiometer-Determination of thermo e.m.f of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
9. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box -Determination of Band gap of a semiconductor.
12. Spectrometer- Determination of wavelength using gating.
13. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille"s flow

TOTAL: 30 PERIODS

OUTCOME:

The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

(CHEMISTRY LABORATORY) (Minimum of 8 experiments to be conducted)

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline/thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
11. Determination of molecular weight of poly vinyl alcohol using Ostwald viscometer.
12. Pseudo first order kinetics-ester hydrolysis.
13. Corrosion experiment-weight loss method.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Vogel's Textbook of Quantitative Chemical Analysis (8^{TH} edition, 2014)
2. Laboratory Manual- Department of Chemistry, CEGC, Anna University (2014).

GE7161	COMPUTER PRACTICES LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use user defined data structures.

LIST OF EXPERIMENTS

1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

TOTAL: 60 PERIODS

OUTCOMES

At the end of the course, the student should be able to:

- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
- Demonstrate the use of conditional statement.

HS7251 **TECHNICAL ENGLISH** **L T P C**
4 0 0 4

OBJECTIVES:

- To enable students acquire proficiency in technical communication.
- To enhance their reading and writing skills in a technical context.
- To teach various language learning strategies needed in a professional environment.

CONTENTS

UNIT I ANALYTICAL READING 12

Listening- Listening to informal and formal conversations; **Speaking** – Conversation Skills(opening, turn taking, closing)-explaining how something works-describing technical functions and applications; **Reading** –Analytical reading, Deductive and inductive reasoning; **Writing**- vision statement–structuring paragraphs.

UNIT II SUMMARISING 12

Listening- Listening to lectures/ talks on Science & Technology; **Speaking** –Summarizing/ Oral Reporting, **Reading** – Reading Scientific and Technical articles; **Writing**- Extended definition –Lab Reports – Summary writing.

UNIT III DESCRIBING VISUAL MATERIAL 12

Listening- Listening to a panel discussion; **Speaking** – Speaking at formal situations; **Reading** – Reading journal articles - Speed reading; **Writing**-data commentary-describing visual material-writing problem-process- solution-the structure of problem-solution texts- writing critiques

UNIT IV WRITING/ E-MAILING THE JOB APPLICATION 12

Listening- Listening to/ Viewing model interviews; **Speaking** –Speaking at different types of interviews – Role play practice (mock interview); **Reading** – Reading job advertisements and profile of the company concerned; **Writing**- job application – cover letter –Résumé preparation.

UNIT V REPORT WRITING 12

Listening- Viewing a model group discussion; **Speaking** –Participating in a discussion - Presentation; **Reading** – Case study - analyse -evaluate – arrive at a solution; **Writing**– Recommendations- Types of reports (feasibility report)- designing and reporting surveys- – Report format.- writing discursive essays.

TEACHING METHODS:

Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication.
Interactive sessions.

EVALUATION PATTERN:

Internals – 50%
End Semester – 50%

TOTAL:60 PERIODS

LEARNING OUTCOMES

- Students will learn the structure and organization of various forms of technical communication.
- Students will be able to listen and respond to technical content.
- Students will be able to use different forms of communication in their respective fields.

TEXTBOOK:

1. Craig,Thaine**. Cambridge Academic English: An integrated skills course for EAP(Student's Book)Level: Intermediate** Cambridge University Press, New Delhi: 2012

REFERENCES:
1. Laws, Anne. **Presentations.** Hyderabad: Orient Blackswan, 2011.
2. Ibbotson, Mark. **Cambridge English for Engineering**. Cambridge University Press, Cambridge, New Delhi: 2008
3. Naterop, Jean B. and Rod Revell. **Telephoning in English**. Cambridge: Cambridge University Press, 2004.
4. Rutherford, Andrea J. **Basic Communication Skills for Technology**. New Delhi: Pearson Education, 2001.
5. Bailey, Stephen. **Academic Writing A practical Guide for Students**. Routledge, London: 2004
6. Hewings, Martin**. Cambridge Academic English: An integrated skills course for EAP(Student's Book) Level: Intermediate** Cambridge University Press, New Delhi: 2012.

MA7251	MATHEMATICS - II (Common to all branches of B.E. / B.Tech. Programmes in II Semester)	L	T	P	C
		4	0	0	4

OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of the electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I MATRICES **12**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of eigenvalues and eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II VECTOR CALCULUS **12**

Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTION **12**

Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c$, az, $\frac{1}{z}$, z^2 - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION **12**

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

UNIT V LAPLACE TRANSFORMS 12

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem — Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students should be able to:
Evaluate real and complex integrals using the Cauchy integral formula and the residue Theorem
Appreciate how complex methods can be used to prove some important theoretical results.
Evaluate line, surface and volume integrals in simple coordinate systems
Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities
Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.

TEXTBOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2014.
2. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.

REFERENCES:

1. Ramana, B.V. “Higher Engineering Mathematics”, Tata Mc Graw Hill, New Delhi, 2010.
2. Glyn James, “Advanced Modern Engineering Mathematics”, Pearson Education, New Delhi, 2007.
3. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.
4. Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
5. Peter V. O’Neil, “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, New Delhi, 2007.

PH7255	PHYSICS FOR ELECTRONICS AND INFORMATION SCIENCE	L	T	P	C
		3	0	0	3

(Common to ECE & IT Branches**)**

OBJECTIVE:

- To understand the essential principles of Physics of semiconductor device and Electron transport properties. Become proficient in magnetic and optical properties of materials and Nano-electronic devices.

UNIT I ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - Quantum free electron theory – Particle in a finite potential well – Tunneling- Particle in a three dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole.

UNIT II SEMICONDUCTORS AND TRANSPORT PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT III MAGNETIC PROPERTIES OF MATERIALS 9

Magnetisation of matter: Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility - Magnetic material classification : diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism – Ferromagnetism: origin and exchange interaction- saturation magnetization and curie temperature – Domain Theory- M versus H behaviour – Hard and soft magnetic materials – examples and uses-– Magnetic principle in computer data storage – Magnetic tapes – Magnetic hard disc (GMR sensor) - Magnetic recording materials .

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – Absorption emission and scattering of light in metals, insulators & Semiconductors - LED's – Organic LED's – Plasma light emitting devices – LCD's – Laser diodes – Optical data storage techniques (including DVD, Blue -ray disc, Holographic data storage).

UNIT V NANO DEVICES 9

Electron density in a conductor – Significance between Fermi energy and volume of the material – Quantum confinement – Quantum structures – Density of states in lower dimensions – Band gap of nanomaterials –Tunneling – Single electron phenomena – Single electron Transistor. Conductivity of metallic nanowires – Ballistic transport – Quantum resistance and conductance – Carbon nanotubes: Properties and applications - Transport of spin – Spintronic devices and applications.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students will able to

- understand the electrical, magnetic and optical properties of semiconductor materials.
- understand the concepts and applications of semiconductor devices.

TEXT BOOKS:

1. Balasubramaniam R. "Callister's Materials Science and Engineering", Wiley-India 2014.
2. Donald Askeland, "Materials Science and Engineering", Cengage Learning India Pvt Ltd., 2010.
3. Kasap S.O., "Principles of Electronic Materials and Devices", Tata Mc Graw-Hill 2007.
4. Pierret R.F., "Semiconductor Device Fundamentals", Pearson 2006.

REFERENCES:

1. Garcia N. and Damask A., "Physics for Computer Science Students", Springer-Verlag, 2012.
2. Datta S., "Quantum Transport: Atom to Transistor", Cambridge University Press 2013.
3. Hanson G.W., "Fundamentals of Nanoelectronics", Pearson Education 2009.
4. Charles Kittel, "Introduction to Solid State Physics", Wiley Publications 2012.
5. Wilson J. and Hawkes, J.F.B., "Optoelectronics: An introduction", Prentice Hall 1989.
6. Neil Gershenfeld, "The Physics of Information Technology", Cambridge Series on Information & the Natural Sciences, Cambridge University Press 2000.

EC7251 **CIRCUIT THEORY** **L T P C**

2 2 0 3

OBJECTIVES:

- To introduce the basic concepts of DC and AC circuits behavior
- To study the transient and steady state response of the circuits subjected to step and sinusoidal excitations.
- To introduce different methods of circuit analysis using Network theorems, duality and topology.

UNIT I DC CIRCUIT ANALYSIS 6+6

Basic Components of electric Circuits, Charge, current, Voltage and Power, Voltage and Current Sources, Ohms Law, Kirchoff's Current Law, Kirchoff's voltage law, The single Node – Pair Circuit, series and Parallel Connected Independent Sources, Resistors in Series and Parallel, voltage and current division, Nodal analysis, Mesh analysis.

UNIT II NETWORK THEOREM AND DUALITY 4+4

Useful Circuit Analysis techniques - Linearity and superposition, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion. Duals, Dual circuits.

UNIT III SINUSOIDAL STEADY STATE ANALYSIS 8+8

Sinusoidal Steady – State analysis , Characteristics of Sinusoids, The Complex Forcing Function, The Phasor, Phasor relationship for R, L, and C, impedance and Admittance, Nodal and Mesh Analysis, Phasor Diagrams, AC Circuit Power Analysis, Instantaneous Power, Average Power, apparent Power and Power Factor, Complex Power.

UNIT IV TRANSIENTS AND RESONANCE IN RLC CIRCUITS 6+6

Basic RL and RC Circuits, The Source- Free RL Circuit, The Source-Free RC Circuit, The Unit-Step Function, Driven RL Circuits, Driven RC Circuits, RLC Circuits, Frequency Response, Parallel Resonance, Series Resonance, Quality Factor.

UNIT V COUPLED CIRCUITS AND TOPOLOGY 6+6

Magnetically Coupled Circuits, mutual Inductance, the Linear Transformer, the Ideal Transformer, An introduction to Network Topology, Trees and General Nodal analysis, Links and Loop analysis.

TOTAL : 30 +30: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Develop the capacity to analyze electrical circuits, apply the circuit theorems in real time
- Design and understand and evaluate the AC and DC circuits.

TEXT BOOKS:

1. William H.Kayt, Jr.Jack E. Kemmerly, Steven M.Durbin, "Engineering Circuit Analysis", Sixth Edition, Tata Mc Graw-Hill Edition, 2012.
2. David A Bell, "Electric Circuits", PHI,2006

REFERENCES:

1. Charles K. Alexander & Mathew N.O.Sadiku, Fundamentals of Electric Circuits", Second Edition, Mc Graw- Hill 2003.
2. D.R.Cunningham, J.A.Stuller, "Basic Circuit Analysis", Jaico Publishing House, 2005

EC7201 **ELECTRONIC DEVICES** **L T P C**
3 0 0 3

OBJECTIVES:

- To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices.

UNIT I PN DIODE and BIPOLAR JUNCTION TRANSISTOR 9

PN junction diode, current equations, V-I characteristics, the bipolar transistor action, minority carrier, distribution, low frequency common base, current gain, non-ideal effects, equivalent circuits, Ebers Moll Model-Gummel Poon-model, Hybrid-pi model, frequency limitations, large signal switching characteristics, SiGe and hetro-junction- bipolar junction transistor.

UNIT II FUNDAMENTALS OF FIELD EFFECT TRANSISTORS 9

Fundamentals of JFETs and their device characteristics, Two terminal MOS structures, threshold voltage and charge distribution, capacitance-voltage characteristics, MOSFET structures, I-V relationships, transconductance and substrate effects, frequency limitations,
non-ideal effects, MOSFET scaling, threshold voltage modification due to short and narrow channel effects, avalanche breakdown, drain induced barrier effects.

UNIT III POWER DEVICES AND DISPLAY DEVICES 9

SCR, Diac, Triac, Power BJT, Power MOSFET, IGBT Heat sinks and junction temperature, LED, LCD, Photo transistor, Opto Coupler, Solar cell, CCD.

UNIT IV SPECIAL SEMICONDUCTOR DEVICES 9

Metal-Semiconductor Junction-MESFET, Schottky barrier diode-Zener diode-Varactor diode – Tunnel diode-Gallium Arsenide device, LASER diode, UJT, LDR.

UNIT V SEMICONDUCTOR PROCESSING 9

Semiconductor materials, Silicon crystal growth and refining, Doping techniques, Ion implantation, Doping impurity diffusion, Gas-phase diffusion, Oxidation, Chemical vapor deposition (CVD), Silicon deposition and epitaxy, Dielectric layer deposition, Photolithography Etching, Metallization, Metal deposition, Metal silicides, CMOS process, bipolar process

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the students will be able to:

- Explain the V-I characteristic of diode, UJT and SCR
- Describe the equivalence circuits of transistors
- Operate the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices

TEXT BOOKS:

1. Donald A Neaman, “Semiconductor Physics and Devices”, Third Edition, Tata Mc Graw Hill Inc. 2007.
2. Streetman and Banerjee, “Semiconductor Physics and Devices”, 6th Edition, Pearson Prentice Hall 2006.

REFERENCES:

1. J. P. Colinge, C. A. Colinge, “Physics of semiconductor devices”, kluwer academic publishers, 2012.
2. Yang, “Fundamentals of Semiconductor devices”, McGraw Hill International Edition, 2007.
3. Robert Boylestad and Louis Nashelsky, “Electron Devices and Circuit Theory” Pearson Prentice Hall, 10thedition, 2008

GE7152 ENGINEERING GRAPHICS

L	T	P	C
3	2	0	4

OBJECTIVES

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) 1

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HANDSKETCHING 14

Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 14

Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes- Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 14

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 14

Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section.

Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 15

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems.

Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY) 3

Introduction to drafting packages and demonstration of their use.

L=45+T=30, TOTAL: 75 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Perform free hand sketching of basic geometrical shapes and multiple views of objects.
- Draw orthographic projections of lines, planes and solids
- Obtain development of surfaces.
- Prepare isometric and perspective views of simple solids.

TEXT BOOK:

1. N.D.Bhatt and V.M.Panchal, “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.

REFERENCES:

1. K.R.Gopalakrishna., “Engineering Drawing” (Vol I&II combined) Subhas Stores, Bangalore, 2007
2. Luzzader, Warren.J., and Duff,John M,’’ Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt Ltd, New Delhi, 2005
3. M.B.Shah and B.C.Rana, “Engineering Drawing”, Pearson, 2nd Edition, 2009.
4. K.Venugopal and V.Prabhu Raja, “Engineering Graphics”, New Age International (P) Limited, 2008.
5. K. V.Natarajan, “A text book of Engineering Graphics”, 28th Edition, Dhanalakshmi Publishers, Chennai, 2015.
6. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata Mc Graw Hill Publishing Company Limited, New Delhi, 2008.
7. N.S Parthasarathy and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

EC7211	ELECTRONIC DEVICES AND CIRCUITS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To learn the characteristics of basic electronic devices such as Diode, BJT,FET, SCR
- To understand the working of RL,RC and RLC circuits
- To gain hand on experience in Thevinin & Norton theorem, KVL & KCL, and Super Position Theorems

1. Characteristics of PN Junction Diode
2. Zener diode Characteristics & Regulator using Zener diode
3. Common Emitter input-output Characteristics
4. Common Base input-output Characteristics
5. FET Characteristics
6. SCR Characteristics
7. Clipper and Clamper & FWR
8. Verifications Of Thevinin & Norton theorem
9. Verifications Of KVL & KCL
10. Verifications Of Super Position Theorem
11. verifications of maximum power transfer & reciprocity theorem
12. Determination Of Resonance Frequency of Series & Parallel RLC Circuits
13. Transient analysis of RL and RC circuits

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Analyze the characteristics of basic electronic devices
- Design RL and RC circuits
- Verify Thevinin & Norton theorem KVL & KCL, and Super Position Theorems

GE7162	ENGINEERING PRACTICES LABORATORY	L	T	P	C
	(Common to all Branches of B.E. / B.Tech. Programmes)	0	0	4	2

OBJECTIVES

- To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICES **15**

PLUMBING

Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.

- Laying pipe connection to the suction side of a pump.
- Laying pipe connection to the delivery side of a pump.
- Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK

- Sawing, planing and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

STUDY

- Study of joints in door panels and wooden furniture
- Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES **15**

- Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
- Stair case light wiring
- Tube – light wiring
- Preparation of wiring diagrams for a given situation.
- Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS) **15**

3. MECHANICAL ENGINEERING PRACTICES

WELDING

- Arc welding of Butt Joints, Lap Joints, and Tee Joints
- Gas welding Practice.
- Basic Machining - Simple turning, drilling and tapping operations..
- Study and assembling of the following:
    a. Centrifugal pump
    b. Mixie
    c. Air Conditioner.

DEMONSTRATION ON FOUNDRY OPERATIONS.

4. ELECTRONIC ENGINEERING PRACTICES **15**

- Soldering simple electronic circuits and checking continuity.
- Assembling electronic components on a small PCB and Testing.
- Study of Telephone, FM radio and Low Voltage Power supplies.

TOTAL: 60 PERIODS

OUTCOMES:

- Ability to fabricate carpentry components and to lay pipe connections including plumbing works.
- Ability to use welding equipments to join the structures
- Ability to do wiring for electrical connections and to fabricate electronics circuits.

EC7301 ELECTRONIC CIRCUITS – I L T P C
2 2 0 3

OBJECTIVES:

- To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues
- To learn about biasing of BJT and MOSFET circuits
- To design amplifiers
- To study the effect of source and load
- To design amplifiers with active loads
- To study high frequency response of amplifiers

UNIT I BIASING OF DISCRETE BJT AND MOSFET 6+6

DC Load line, operating point, Various biasing methods for BJT-Design-Stability-Bias compensation, Thermal stability, DC bias analysis of MOSFET circuits.

UNIT II BJT AMPLIFIERS 6+6

Small signal Analysis of Common Emitter-AC Loadline, Voltage swing limitations, Common collector and common base amplifiers – Differential amplifiers- CMRR- Darlington Amplifier-Bootstrap technique - Multi stage amplifiers - Cascode Amplifier.

UNIT III MOSFET AMPLIFIERS 6+6

Small signal Analysis of amplifiers, Common source amplifier, Voltage swing limitations, Small signal analysis of Source follower and Common Gate amplifiers, Cascode amplifiers, Differential amplifiers, BiMOS Cascode amplifier.

UNIT IV FREQUENCY ANALYSIS OF BJT AND MOSFET AMPLIFIERS 6+6

Low frequency analysis, Miller effect, High frequency analysis of CE and MOSFET CS amplifier, Short circuit current gain, cut off frequency – fα fβ, Unity Gain Bandwidth, Determination of bandwidth e of cascode, differential amplifier and multistage amplifiers.

UNIT V IC MOSFET AMPLIFIERS 6+6

IC biasing Current steering circuits for IC amplifiers- current mirrors, - current sources- PMOS and NMOS current sources, Cascode current source, Widlar current source and Bias independent current source. Amplifier with resistive load - Depletion load, current source load and active load, Differential amplifiers and Common Mode Feedback circuits.

TOTAL: 30L + 30T: 60 PERIODS

OUTCOMES:

- Ability to comprehend and appreciate the significance and role of this course in the present contemporary world

  At the end of the course the students will be able to
- Choose appropriate biasing circuit for BJT and MOSFET amplifiers.
- Design and analyze amplifiers.
- Determine the effect of source and load.
- Design amplifiers with active loads meant for ICs.
- Exposed to high frequency response of BJT and MOSFET amplifiers.
- Design biasing circuits for IC amplifiers.

TEXT BOOKS:

1. Donald .A. Neamen, Electronic Circuit Analysis and Design –3rd edition, Tata McGraw Hill, 2010.
2. Adel .S. Sedra, Kenneth C. Smith, Micro Electronic circuits, 7th Edition, Oxford University Press, 2014.

REFERENCES:

1. David A. —Bell Electronic Devices and Circuits, Oxford Higher Education press,5th Edition,2010
2. Behzad Razavi, — Design of Analog CMOS Integrated Circuits‖, Tata Mc Graw Hill, 2007.
3. Paul Gray, Hurst, Lewis, Meyer —Analysis and Design of Analog Integrated Circuits‖, 4th Edition, John Willey & Sons 2005
4. Millman .J. and Halkias C.C, —Integrated Electronics‖, McGraw Hill, 2001.
5. D.Schilling and C.Belove, —Electronic Circuits‖, 3rd edition, McGraw Hill, 1989

EC7352	DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING IN C++	L T P C 3 2 0 4

OBJECTIVES:

- To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues
- This course comprehends the fundamentals of object oriented programming, particularly in C++, which are then used to implement data structures. This also gives an idea of linear and non-linear data structures and their applications.

UNIT I DATA ABSTRACTION & OVERLOADING 9+6

Overview of C++ – Structures – Class Scope and Accessing Class Members – Reference Variables – Initialization – Constructors – Destructors – Member Functions and Classes – Friend Function – Dynamic Memory Allocation – Static Class Members – Container Classes and Integrators – Proxy Classes – Overloading: Function overloading and Operator Overloading.

UNIT II INHERITANCE & POLYMORPHISM 9+6

Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – Implicit Derived – Class Object To Base – Class Object Conversion – Composition Vs. Inheritance – Virtual functions – This Pointer – Abstract Base Classes and Concrete Classes – Virtual Destructors – Dynamic Binding.

UNIT III LINEAR DATA STRUCTURES 11+6

Asymptotic Notations: Big-Oh, Omega and Theta – Best, Worst and Average case Analysis: Definition and an example – Arrays and its representations – Stacks and Queues – Linked lists – Linked list based implementation of Stacks and Queues – Evaluation of Expressions – Linked list based polynomial addition.

UNIT IV NON-LINEAR DATA STRUCTURES 9+6

Trees – Binary Trees – Binary tree representation and traversals – Threaded binary trees – Binary tree representation of trees – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals – Connected components.

UNIT V SORTING & SEARCHING 7+6

Insertion sort – Merge sort – Quick sort – Heap sort – Linear Search – Binary Search.

TOTAL: 45L + 30T: 75 PERIODS

OUTCOMES:

- Ability to comprehend and appreciate the significance and role of this course in the present contemporary world
- Select suitable data structure for specific Application.
- Compare Linear and nonlinear data structures for different application.
- Perform different searching and sorting techniques.
- Identify connected components in trees.
- Analyze asymptotic notations

TEXT BOOKS:

1. Deitel and Deitel, " C++, How To Program", Fifth Edition, Pearson Education, 2005.
2. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, Fundamentals of Data Structures in C++, 2nd edition, Universities Press Pvt Ltd., Hyderabad , 2007.

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Third Edition, Addison-Wesley, 2007.
2. Bhushan Trivedi, "Programming with ANSI C++, A Step-By-Step approach", Oxford University Press, 2010.
3. Goodrich, Michael T., Roberto Tamassia, "David Mount. Data Structures and Algorithms in C++", 7th edition, Wiley. 2004.

EC7353 DIGITAL ELECTRONICS AND SYSTEM DESIGN L T P C
3 0 0 3

OBJECTIVES:

- To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues
- To introduce Boolean algebra and its applications in digital systems
- To introduce the design of various combinational digital circuits using logic gates
- To bring out the analysis and design procedures for synchronous and asynchronous Sequential circuits
- To introduce the electronic circuits involved in the making of logic gates
- To introduce semiconductor memories and related technology

UNIT I BASIC CONCEPTS AND COMBINATIONAL CIRCUITS 9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, 84-2-1, 2421, Excess 3, Biquinary, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map and Tabulation methods.

UNIT II MSI CIRCUITS 9

Problem formulation and design of combinational circuits - Code-Converters, Half and Full Adders, Binary Parallel Adder – Carry lookahead Adder, BCD Adder, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Mux/Demux, Case study: Digital transreciver / 8 bit Arithmetic and logic unit

UNIT III SYNCRONOUS SEQUENTIAL CIRCUITS 9

Flip flops – SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis and design of clocked sequential circuits – Design - Moore/Mealy models, state minimization, state assignment, circuit implementation - Counters, Ripple Counters, Ring Counters, Shift registers, Universal Shift Register. Model Development: Designing of rolling display/real time clock

UNIT III ASYNHRONOUS SEQUENTIAL CIRCUITS 9

Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits.

UNIT V LOGIC FAMILIES AND PROGRAMMABLE LOGIC DEVICES 9

Logic families- TTL, MOS, CMOS, BiCMOS - Comparison of Logic families - Implementation of combinational logic/sequential logic design using standard ICs, ROM, PLA and PAL

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to comprehend and appreciate the significance and role of this course in the present contemporary world
- Use Boolean algebra and apply it to digital systems.
- Design various combinational digital circuits using logic gates.
- Bring out the analysis and design procedures for synchronous and asynchronous sequential circuits.
- Use electronic circuits involved in the design of logic gates.
- Ability to use the semiconductor memories and related technology.

TEXT BOOKS:

1. M. Morris Mano and Michael D. Ciletti, “Digital Design”, 5th Edition, Pearson, 2013.
2. Charles H. Roth, Jr, “Fundamentals of Logic Design”, Fourth edition, Jaico Books, 2002.

REFERENCES:

1. William I. Fletcher, “An Engineering Approach to Digital Design”, Prentice- Hall of India, 1980.
2. Floyd T.L., “Digital Fundamentals”, Charles E. Merril publishing company,1982.
3. John. F. Wakerly, “Digital Design principles and practices”, Pearson Education, Fourth Edition, 2007.

EC7355 SIGNALS AND SYSTEMS L T P C

2 2 0 3

OBJECTIVES:

- To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues
- To introduce visualization and mathematical representation of continuous-time and discrete-time signals
- To teach the applications of Laplace and Fourier transforms in the analysis of continuous-time signals
- To teach the applications of Z- and Fourier transforms in the analysis of discrete – time signals

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 6+6

Continuous time signals (CT signals)- Discrete time signals (DT signals) – Step, Ramp, Pulse, Impulse, Exponential - classification of CT and DT signals – periodic and a periodic signals, random signals, Energy & Power signals - CT systems and DT systems, Classification of systems.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS 6+6

Fourier series analysis- Spectrum of Continuous Time (CT) signals- Fourier and Laplace transforms in Signal Analysis.

UNIT III LINEAR TIME INVARIANT –CONTINUOUS TIME SYSTEMS 6+6

Differential Equation-Block diagram representation-impulse response, convolution integrals-Fourier and Laplace transforms in Analysis.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS 6+6

Baseband Sampling of CT signals- Aliasing, Reconstruction of CT signal from DT signal DTFT and properties, Z-transform & properties.

UNIT V LINEAR TIME INVARIANT –DISCRETE TIME SYSTEMS 6+6

Difference Equations-Block diagram representation-Impulse response-Convolution sum-DTFT and Z Transform analysis of Recursive & Non-Recursive systems.

TOTAL: 60 PERIODS

OUTCOMES:

- Ability to comprehend and appreciate the significance and role of this course in the present contemporary world
- To compute the spectrum of any signal
- To identify the requirements and use transforms for processing real-world signals
- To analyse and design continuous-time and discrete-time systems

TEXT BOOKS:

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, “Signals and Systems”, Pearson, Indian Reprint, 2007.
2. B. P. Lathi, “Principles of Linear Systems and Signals”, Oxford, Second Edition, 2009.

REFERENCES:

1. H P Hsu, “Signals and Systems”, Schaum’s Outlines, Tata McGraw Hill,2006
2. S. Haykin and B. Van Veen, "Signals and Systems", Second Edition, Wiley, 2003.
3. P.Ramakrishna Rao, “Signals and Systems” , Tata Mc Graw Hill Publications, 2008.
4. Edward W. Kamen, Bonnie S. Heck, “Fundamentals of Signals and Systems Using the Web and MATLAB”, Pearson, Indian Reprint, 2007
5. John Alan Stuller, “An Introduction to Signals and Systems”, Thomson, 2007
6. M.J.Roberts, “Signals & Systems, Analysis using Transform methods & MATLAB”, Tata McGraw Hill (India), 2007.

EE7252 BASICS OF ELECTRICAL ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision
- To introduce Magnetic circuits, principle and application of transformers
- To teach principle of operation of DC motors and AC machines
- To teach principle of special electrical machines

UNIT I MAGNETIC CIRCUITS AND ENERGY CONSERVATION 9

Magnetic effects of electric current- Magnetic circuits- Magnetic materials and B-H relationship Energy and co-energy- Electromagnetic induction and force- Hysteresis and eddy current losses.

UNIT II TRANSFORMER 9

Introduction – Single phase transformer construction and principle of operation – EMF equation of transformer-Transformer no–load phasor diagram –– Transformer on–load phasor diagram –– Equivalent circuit of transformer – Regulation of transformer –Transformer losses and efficiency-All day efficiency –auto transformers.

UNIT III DC MACHINES 9

Construction of DC machines – Theory of operation of DC generators – EMF and torque equations-Characteristics of DC generators- Applications, Operating principle of DC motors – Types of DC motors and their characteristics – Speed control of DC motors- Applications

UNIT IV INDUCTION MACHINES AND SYNCHRONOUS MACHINES 9

Principle of operation of three-phase induction motors – Construction –Types – Equivalent circuit – Construction of single-phase induction motors – Double -revolving field theory – starting methods - Principles of alternator – Construction details – Types – Equation of induced EMF – Voltage regulation. Methods of starting of synchronous motors – Torque equation – V curves – Synchronous motors.

UNIT V SPECIAL ELECTRICAL MACHINES 9

Switched reluctance motor, stepper motor, servo motor, BL DC motor- working principles, speed-torque characteristics and applications.

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to comprehend and appreciate the significance and role of this course in the present contemporary world

  At the end of the course the students will be able to
- Describe magnetic circuits, principles of operation of transformers, DC machines.
- Explain the working of AC machines and special electrical machines

TEXT BOOKS:

1. I.J Nagarath and Kothari DP "Electrical Machines "Tata McGraw Hill ,2010.
2. P.C. Sen, "Principles of Electric machines and Power electronics", John- Wiley& sons 2nd edition ,2007.

REFERENCES:

1. A. E. Fitzgerald, Charles Kingsley, Stephen D. Umans, "Electrical Machinery" 6th Edition, Mc Graw Hill, 2013.
2. Stephen J. Chapman, "Electrical Machinery Fundamentals", 4th Edition, Mc Graw Hill, 2003.
3. Edward Hughes, Revised by John Keith Brown and Ian McKenzie Smith, "Hughes Electrical and Electronic Technology", Pearson Education Limited, 10th Edition, 2016.

MA7358 TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS L T P C 4 0 0 4

OBJECTIVES:

- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes;
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems;
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic;
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange's Linear equation – Integral surface passing through a given curve – Classification of partial differential equations - Solution of linear equations of higher order with constant coefficients – Linear non-homogeneous partial differential equations.

UNIT II FOURIER SERIES 12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION 12

Method of separation of variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in cartesian coordinates.

UNIT IV FOURIER TRANSFORM 12

Fourier integral theorem – Fourier transform pair - Sine and cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 12

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and final value theorems – Formation of difference equation – Solution of difference equation using Z - transform.

TOTAL: 60 PERIODS

OUTCOME:

- The students can able to solve the partial differential equations, find the Fourier series analysis and solve the problems by using Fourier transform and Z transform techniques.

TEXTBOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Erwin kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 9th Edition, New Delhi, 2014

REFERENCES:

1. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, New Delhi, 2007.
2. Ramana, B.V. "Higher Engineering Mathematics", Tata McGraw Hill, New Delhi, 11th Reprint , 2010.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
4. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.

EC7311 DIGITAL AND ELECTRONIC CIRCUIT LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To learn hardware implementation and testing of analog and digital circuits
- To design amplifier circuits to meet desired specifications
- To understand the functionality of combinational and sequential circuits
- To simulate basic combinational and sequential circuits using Hardware Description Language HDL

1. Implementation of Boolean expression using universal gates, BCD adder and 2-bit Magnitude comparator
2. Implementation of Boolean expression using MUX and truth table verification of RS, JK, T, and D Flip Flops
3. BCD counter and counters with seven segment display
4. Data transfer using shift registers
5. Realization of Digital circuits using HDL – Combinational circuits
6. Realization of Digital circuits using HDL – Sequential circuits
7. Frequency Response of CE, CB amplifiers and its Spice simulation
8. Design of CC Amplifier for a specific output impedance and its Spice Simulation
9. Spice simulation of CS, CG, and CD configuration of MOSFET amplifiers with various active

load configurations.

10. Design of Differential Amplifiers and its CMRR measurement
11. Frequency response of cascode amplifier
12. Frequency response of cascade amplifier

TOTAL: 60 PERIODS

OUTCOMES:

- Ability to design, build and test any digital logic and analog circuits for handling real life projects.
- Exposed to circuit simulations using present meter technology MOSFETs.
- Exposed to digital IC circuit simulators using HDL.

EE7361 ELECTRICAL ENGINEERING LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues
- To provide hands on experience with generators and motors.
- To Understand the working of DC/AC motors and generators
- To study the characteristics of transducers
- To learn the use of transformer
- To understand the behavior of linear system through simulation
- To gain knowledge of controllers

1. Study of DC & AC motor starters
2. Open Circuit and Short Circuit test on single phase transformer to draw its equivalent circuit
3. Regulation of three phase alternator
4. Study of three phase circuits
5. Speed Control of DC shunt motor
6. Load Test on DC shunt motor
7. OCC & Load Characteristics of DC shunt generator
8. Load test on single-phase transformer
9. Load test on three-phase Induction motor
10. Load test on single-Phase Induction motor

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Ability to comprehend and appreciate the significance and role of this course in the present contemporary world
- Perform experiments to study the load characteristics of DC motors / generators.
- Design bridge network circuit to measure the values of passive component.
- Analyse the stability of linear system through simulation software.
- Obtain transfer function of DC generators.